Tracing peridotite and pyroxenite sources of Karoo flood basalts in the Tete province, Mozambique

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Geochemical mapping of ca. 180 Ma Karoo continental flood basalts in the Tete province, central Mozambique, reveals compositional variability that may reflect the amount of recycled pyroxenite source components. Two principal categories of flood basalts can be distinguished based on trace element characteristics: 1) Chemically diverse lavas and dikes from the Lupata trough and the Moatize-Luia graben are low-Ti to high-Ti tholeiites (TiO_2 1.0—4.1 wt.%) and mildly alkaline basalts that show high primitive mantle-normalised $(Nd/Y)_N$ (1.3—3.7) typical of intra-plate magmas generated at high pressures. 2) A suite of high-Mg tholeiite lavas and dikes from the Moatize-Luia graben show notably low TiO_2 (0.3—1.2 wt.%) and $(Nd/Y)_N$ (0.7—1.3) that overlap with those of MORB and point to generation at lower pressures.

The ratios of highly incompatible elements and preliminary Nd and Sr isotope data suggest that the studied rocks may have been contaminated with crust and lithospheric mantle. We have therefore used contamination resistive Zn/Fe to address the importance of peridotite (low Zn/Fe) and pyroxenite (high Zn/Fe) source components. The relatively high values of fractionation-corrected Zn/Fe ($11\pm1 \times 10^{-4}$) in the high-$(Nd/Y)_N$ samples suggest that the high-pressure magmas have been derived from a pyroxenite-rich source at high pressure. In contrast, the low-pressure suite, characterised by MORB-affinity $(Nd/Y)_N$, low Zn/Fe ($8\pm1 \times 10^{-4}$) as well as low-Ni olivine and high-Al spinel phenocrysts, may have been derived from a pyroxenite-free mantle source.